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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
Carr et al.

Application No.: 09/689,289

Filed: October 11, 2000

For: PRINTING MEDIA AND METHODS EMPLOYING DIGITAL WATERMARKS

Examiner: B. Bayat

Date: September 9, 2005

Art Unit 3621

Confirmation No. 1154

CERTIFICATE OF MAILING

I hereby certify that this paper and the documents referred to as being attached or enclosed herewith are being deposited with the United States Postal Service on September 9, 2005 as First Class Mail in an envelope addressed to: Mail Stop Appeal Brief – Patents, COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450.

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APPEAL BRIEF (SECOND)[1]

Sir:

This brief is in furtherance of the Notice of Appeal filed May 12, 2005. Please charge the fee required under 37 CFR 1.17(f), or any deficiency, to deposit account 50-3284 (see transmittal letter).

[1] An earlier appeal brief was filed on April 8, 2004, in response to which the examiner reopened prosecution.

I. REAL PARTY IN INTEREST

The real party in interest is Digimarc Corporation, by an assignment from the inventors recorded at Reel 11520, Frames 832-33, on February 1, 2001.

II. RELATED APPEALS AND INTERFERENCES

There is no case with a priority relationship to the present application that is the subject of an appeal or interference.

Applicant is the assignee of a re-examination certificate that was appealed during its prosecution. The issue on appeal was whether certain claims were statutory under § 101. Like the claims presently at issue, the appealed claims were drawn to media conveying steganographically encoded information.

In a non-precedential opinion the Board reversed the Examiner and found the claims to be statutory. In the opinion's concluding paragraph the Board stated:

> *Claims 51-65 are directed to images or audio data embodied in a tangible medium having embedded message codes of a specific structure which can later be discerned for identification purposes by a machine. They therefore meet the definition of "functional descriptive material" because the embedded message codes impart functionality when employed in a computer capable of acting on them. The claims are not directed to the images or audio data per se and, so, cannot be described as mere "nonfunctional descriptive materials." This is all the analysis that should be required.*

A copy of the Board's opinion is attached as Exhibit C. (Reexam 90/005,911; Appeal No. 2003-1084; Reexamination certificate 6,112,393C1.)

III. STATUS OF CLAIMS

Claims 1-21 stand finally rejected and are appealed.

IV. STATUS OF AMENDMENTS

All earlier-filed amendments have been entered.

V. BACKGROUND AND SUMMARY OF CLAIMED SUBJECT MATTER

Applicants' invention relates to the use of digital watermarks in connection with envelopes and other documents, to provide enhanced functionality and new features.

Digital watermarking is the science of hiding secret information – often in some other data, and without leaving any apparent evidence of data alteration.[2]

Digital watermarking can take many forms - several are detailed in patent documents incorporated-by-reference in the present specification.[3] One form of digital watermarking favored by the present Applicants involves making subtle changes to the values of pixels comprising a printed indicia (e.g., a postal meter stamp, sometimes known as a "franking mark"[4]) to thereby encode a hidden multi-bit auxiliary data payload. The changes are too slight to be perceptible to human viewers of the indicia. But when such a watermark-encoded indicia is captured and computer analyzed, the multi-bit payload can be recovered, and a corresponding action can be triggered thereby.

When digitally watermarking a blank substrate – such as an unprinted envelope – there is no indicia to subtly change. In such cases, digital watermarking can still be effected, e.g., by depositing tiny speckles of ink[5] to give the envelope a slight tint.[6] Again, the droplets of ink define a pattern that can be sensed by a compliant decoder, and the multi-bit data can be decoded therefrom.

Alternatively, another way to realize a digital watermark is to create a subtle texture pattern on a surface. The micro-topological features of the texture appear substantially uniform

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2 Digital watermarking is a well developed art that is not belabored in the present specification. Instead, the present specification incorporates-by-reference earlier patents and applications on the subject, as detailed in fn. 3.

3 *See, e.g.,* specification, page 4, line 29 through page 5, line 1; page 15, line 4; and the incorporation by reference language found at page 15, lines 7-9.

4 *See, e.g.,* specification, page 2, lines 15-16.

5 Specification, page 7, line 13.

6 Specification, page 2, line 26; page 14; line 26; and application 09/127,502 incorporated by reference at page 5, line 1 (now patent 6,345,104).

to human inspection, but analysis of scan data corresponding thereto reveals deliberate patterning that encodes the multi-bit auxiliary data.[7]

Common to all forms of digital watermarks is the fact that data is encoded in hidden fashion, without leaving human apparent evidence of its presence.[8]

Digital watermarks discussed in the specification are of two classes: robust and fragile.[9] Robust digital watermarks – as that term is used herein - are watermarks which are designed to survive through various forms of corruption to which printed documents may be subject, such as scanning by a flatbed scanner, conversion into a JPEG image file, and subsequent printing by an ink-jet printer. Despite such transformations a robust watermark can still be decoded.

Fragile digital watermarks, on the other hand, are designed to *not* withstand such processing.[10]

In accordance with one aspect of the invention, an original envelope has a fragile digital watermark formed thereon, representing plural bits of digital data.[11] Since the fragile watermark will not persist through a photocopying operation, the watermark serves as a hallmark permitting a photocopy of the envelope to be distinguished from the original.

In accordance with a further aspect of the invention, such an envelope with a fragile digital watermark can also include a second digital watermark – one that withstands at least certain photocopying operations.[12] This second watermark can serve a variety of purposes.

For example, the data conveyed by the second watermark can serve to direct a web browser to a web page that corresponds to the digitally watermarked envelope.[13] Alternatively, the data conveyed by the second watermark can identify the person or device that originated the envelope.[14] Still further, either watermark can signal – to a compliant photocopier – that the envelope should not be reproduced.[15]

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7 *See, e.g.,* specification, page 7, lines 15-20.
8 Specification, page 4, lines 9-11.
9 Fragile watermarks are sometimes termed "frail."
10 Specification, page 2, lines 4-8; page 6, lines 14-21.
11 Claim 1.
12 Claim 4.
13 Claim 5.
14 Claim 6.
15 Claim 7.

The digital watermark can be formed on the envelope at a variety of different times. For example, it may be applied simultaneously with franking mark,[16] and may even be printed by the same device used to print the franking mark.[17]

The digital watermark(s) can be formed on the envelope at a variety of different places. For example, a watermark can occupy a region that is also occupied by a franking mark.[18] Alternatively, a watermark that persists through photocopying can be printed on a side of the envelope opposite a digital watermark that does not survive through photocopying (the fragile watermark).[19]

While the foregoing discussion has focused on digital watermarks as applied to envelopes, other aspects of the invention extend to other substrates – e.g., blank substrates suitable for later printing.[20] Again, such a substrate can be marked with a fragile digital watermark, to permit photocopies of a document printed thereon to be distinguished from the original.[21] Likewise, such a substrate can also be marked with a second digital watermark that withstands at least certain photocopying operations.[22] The watermark(s) can serve the purposes detailed earlier, including permitting linking to internet sites, identifying the originator of the document, and signaling to compliant reproduction equipment that the document should not be reproduced.[23]

VI. GROUNDS OF REJECTION

Claims 1-21 stand rejected as drawn to non-statutory subject matter under § 101.

Claims 1-3, 12-13 also stand rejected under § 103 over Leon (6,701,304) in view of Bhaskaran (6,074,764).

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16 Claim 8.
17 Claim 9.
18 Claim 10.
19 Claim 11.
20 Claim 14.
21 *Ibid.*
22 Claim 17.
23 Claims 18, 19 and 21.

Claims 4-11 also stand rejected under § 103 over Leon in view of Bhaskaran and Yeung (*Digital Watermarks: Shedding Light on the Invisible*).

Claims 14-21 also stand rejected based on combinations of Leon with Bhaskaran and Yeung.

VII. ARGUMENT - § 101

Each of the claims stands rejected under § 101, as allegedly drawn to non-statutory subject matter.

This is not a case where a claim is drawn to an envelope printed with a picture, or to a paper document printed with a poem. Such claiming of nonfunctional descriptive material on a medium would be non-statutory under § 101.

Rather, this is a case where the claims are drawn to mediums that are encoded with plural bits of digital data. This digital data allows a functional interrelationship to be established with a cooperating computing process. Namely, the encoded information *permits a photocopy of the envelope (or substrate) to be distinguished from the original.*

It will be recognized that such technology affords vital functionality in numerous security applications.

Such claims define statutory subject matter under § 101.

The dependent claims add further technological, and structural, limitations. For example, claim 3 calls for texturing the envelope surface to form the watermark. Since the claim defines novelty of the envelope in terms of physical *structure*, it is statutory regardless of whether the watermark thereby encoded has *any* function. (Analogous is a claim that defines a computer memory by reference to an aspect of its physical novelty; the memory may be further described in the claim as having nonfunctional descriptive material stored therein, yet the claim would still be statutory.)

Claim 4 calls for a second digital watermark that withstands at least certain photocopying operations. The claim has two-fold functionality. The first watermark permits an original envelope to be distinguished from a photocopy. The second watermark functions to convey

information through the lossy processes of scanning the original envelope and printing a corresponding photocopy thereof.

Claim 7 (dependent from claim 4) specifies that one of the watermarks serves to signal to compliant equipment that the envelope should not be reproduced – again, a *functional* limitation.

The other claims are similarly statutory.

The Final Rejection failed to establish a *prima facie* rejection under § 101. As the MPEP explains:

> *Office personnel have the burden to establish a prima facie case that the claimed invention as a whole is directed to solely an abstract idea or to manipulation of abstract ideas or does not produce a useful result. Only when the claim is devoid of any limitation to a practical application in the technological arts should it be rejected under 35 U.S.C. 101.*[24]

No such showing was made in the Final Rejection.

The MPEP also requires, "*Further, when such a rejection is made, Office personnel must expressly state how the language of the claims has been interpreted to support the rejection.*"[25]

Again, the Final Rejection did not comply with this requirement.

The rejections under §101 should be reversed because they did not meet the required burden, and, more importantly, because the claimed subject matter is statutory under the § 101.

VIII. ARGUMENT - § 103

The Office earlier issued a final rejection of essentially the same claims[26] over art by Gilham, Bloom, Moskowitz, and Daigneault. That rejection was appealed 2003, and withdrawn prior to consideration by the Board.

In reopened prosecution the Office rejected the claims on new art: Leon, in combination with Bhaskaran and Yeung.

As before, the appealed rejections should be reversed.

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24 MPEP § 2106 IIA (emphasis added).

25 *Ibid.*

26 Claims 20 and 21 have been amended by substituting the word "document" for "envelope."

1. Review of Principal Leon Reference, and Watermarks

The principal reference, Leon (6,701,304), discloses a postage label. The label is comprised of 3 portions: a human readable portion, a machine readable-portion, and an identifier portion.

The human-readable portion comprises alphanumeric printing - providing information such as the value of the postage, the origination city, the machine ID, and the date of posting (see 410, Fig. 4; col. 12, lines 59-62). The machine-readable portion includes a PDF 417 barcode and a linear barcode (an "FIM" mark), used by postal authorities to detect fraud (see 412, 414, Fig. 4; col. 13, lines 24-25). Leon's Fig. 4 is shown below:

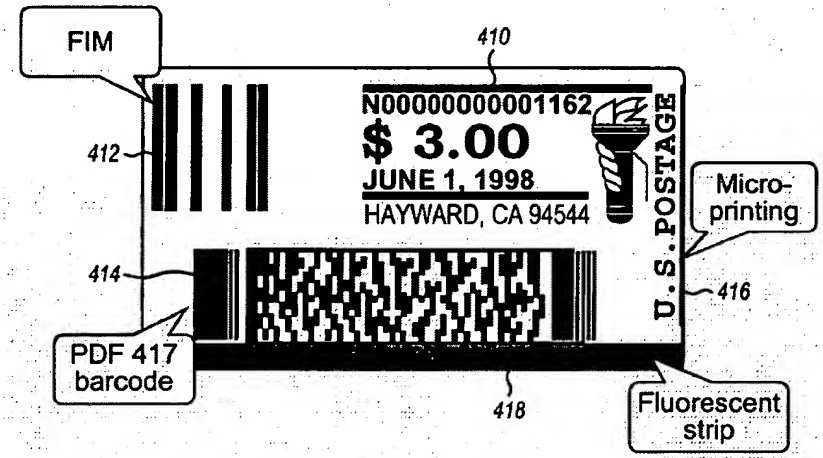

FIG. 4

The identifier portion exhibits characteristics useful in deterring fraudulent production of the label, and can comprise mechanisms such as a fluorescent strip, or taggant beads that encode information by their color arrangements or by their radio resonant frequencies. Other fraud-deterring mechanisms are also listed (see 418, Fig. 4; col. 2, lines 42-45).

The Final rejection is premised on the assertion that Leon discloses digital watermarks as required by Applicants' claims.

Not so. The Office misapplies Leon's disclosure. The Action confuses centuries-old

paper watermarks for the different *digital* watermarks of the type claimed.

Contrary to the statement in the Final Action, Leon does *not* disclose "an original envelope having encoded thereon a digital watermark..."[27] A check of the on-line version of text of Leon's patent confirms that there is no reference to any *digital* watermark.

There are three references to "watermark" in Leon. The first is at column 2, line 43. The second is at column 8, line 19. The third is at column 9, line 40.

The first and second references are essentially the same (one is in the "Summary of the Invention" section; the other is in the "Description of the Specific Embodiments"). The former reads:

> ***The contents of the indicia can include human-readable and machine-readable data elements. Human-readable information includes*** *texts and graphics (e.g., date, address, postage amount, and so on) that can be interpreted by an operator without the use of special translation equipment.* ***Machine-readable information includes*** *graphical representations and encoded texts (e.g., bar codes, FIM marks, data matrix, encoded texts, specially formatted texts, unintelligible texts, and others) that are not readily interpreted by the operator.* ***The postage labels can also include identifier information*** *that exhibits special characteristics and that can be used for authenticating the indicia. The identifiers include, for example, fluorescent strips,* ***marks such as watermarks****, micro printing, imprints using special ink and/or taggants, and other features, as described below. The identifier information assists in the prevention and detection of fraud, again as described below.*

Leon is here describing his label as including three types of elements: (a) human readable information; (b) machine-readable information; and (c) "identifier" information. He lists watermarks in the "identifier" group.

Leon does *not* describe his watermark as being one of the machine-readable data elements. If Leon contemplated a digital watermark of the sort presently claimed (i.e., representing plural bits of data), then he would have listed it as one of the machine-readable data elements. He did not.

Instead, his listing of "marks such as watermarks" among the third class of features – neither human-readable nor machine-readable, but "identifier information" – indicates that Leon is speaking of conventional paper watermarks – of the type that have been formed in fine papers

for centuries.

The *Encyclopedia Britannica* (excerpt earlier filed and now attached as Exhibit A) defines a watermark as a "design produced by creating a variation in the thickness of paper fibre during the wet-paper phase of papermaking." The *Britannica* goes on to note, "Watermarks are often used commercially **to identify** the manufacturer or the grade of paper. They have also been used to detect and prevent counterfeiting and forgery." Such a watermark would be appropriate to use in the "identifier" portion of Leon's label.

The on-line encyclopedia *Wikipedia* defines a watermark as "a recognizable image or pattern in paper that appears lighter when viewed by transmitted light (or darker when viewed by reflected light, atop a dark background)." It goes on to explain, "A watermark is made by impressing a water coated metal stamp or dandy roll onto the paper during manufacturing. Watermarks were first introduced in Bologna, Italy in 1282; they have been used by papermakers **to identify** their product, and also on postage stamps, currency, and other government documents to discourage counterfeiting." (See excerpt earlier filed and now attached as Exhibit B.) Again, this emphasizes use of traditional paper watermarks as "identifiers."

When Leon speaks of watermarks as "**identifier** information that exhibits special characteristics and that can be used for authenticating the indicia" he is referring to the identifying functions highlighted by both the Encyclopedia Britannica and Wikipedia (*i.e.*, "Watermarks are often used commercially **to identify** the manufacturer or the grade of paper" and "they have been used by papermakers **to identify** their product").

The only other reference to "watermark" in Leon (col. 9, line 40) states

> *Under normal lighting conditions, the imprints can be viewed in similar ways as **watermarks**, but are typically not conspicuous.*

Again, this usage confirms that Leon is speaking of conventional paper watermarks – indicating that they are conspicuous (i.e., by distinguishing the inconspicuousness of his imprints). *Digital* watermarks are a form of steganographic encoding, and are thus designed to

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[27] February 9, 2005, Final Rejection, page 5, 7th and 8th lines from bottom; emphasis added.

not to be viewable. The Detailed Description of the present specification begins by explaining (page 4, lines 9-11):

> Digital watermarking technology, a form of steganography, encompasses a great variety of techniques by which plural bits of digital data **are hidden** in some other object **without leaving human-apparent evidence of alteration or data representation**.

Again, this is different than Leon's (visible, paper) watermark.

2. Claim 1 (§ 103: Leon + Bhaskaran)

Claim 1 reads:

> *1. An original envelope having encoded thereon a fragile digital watermark representing plural bits of digital data, said watermark permitting a photocopy thereof to be distinguished from the original.*

The rejection fails to establish *prima facie* obviousness.

One reason the *prima facie* burden was not met is because the rationale for the proposed combination of Leon + Bhaskaran is based on an error of fact. As discussed above, the Final Rejection is in error when it states that Leon discloses "an original envelope having encoded thereon a digital watermark..."[28] The premise for the Final Rejection argument that Bhaskaran's watermark can be substituted for Leon's, fails.

Premised, as it is, on an error, the rejection of claim 1 cannot meet the *prima facie* burden.

Another reason the rejection does not meet the *prima facie* burden is because – absent hindsight – it is not a combination to which an artisan would be led.

For example, the Action rationalizes combining Bhaskaran with Leon, because incorporation of Bhaskaran's fragile digital watermark would allow Leon to detect tampering and to deter fraudulent production of his label.[29]

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[28] February 9, 2005, Final Rejection, page 5, 7th and 8th lines from bottom; emphasis added.

[29] February 9, 2005, Final Rejection, sentence bridging pages 5 and 6.

But Leon already provides that functionality. His "identifier information" (such as his taggant beads, and his fluourescent strip, and his conventional paper watermark) are all provided for the purpose of preventing and detecting fraud. (See, e.g., Leon at col. 2, lines 44-45, "*The identifier information assists in the prevention and detection of fraud...*")

Why would an artisan incorporate teachings from Bhaskaran to detect and deter fraud, when Leon already teaches multiple mechanisms that afford such functionality? The Final Rejection provides no reason. It appears hindsight has tainted the analysis.

The rejection of claim 1 is thus flawed on multiple grounds. Reversal is required.

3. Claim 2 (§ 103: Leon + Bhaskaran)

Claim 2 depends from claim 1 and is similarly allowable. Moreover, claim 2 is patentable independently. The claim reads:

> *2. The envelope of claim 1 in which the watermark is formed with ink.*

Again, the rejection failed to meet the *prima facie* burden. Again, the failure is based on a mistaken reading of the Leon reference.

In connection with claim 2, the Action states "*Leon further discloses the envelope of claim 1 in which the watermark is formed with ink (column 2, lines 20-46).*"

Not so. Nowhere does Leon teach forming any watermark with ink. The reference to ink in the cited passage refers to inks bearing taggant beads (column 2, lines 28 and 44). Leon does not disclose forming a watermark with ink.

Again, because the rejection is based on an error of fact, the *prima facie* burden has not been met. Again, reversal is required.

4. Claim 3 (§ 103: Leon + Bhaskaran)

Claim 3 depends from claim 1 and is similarly allowable. Moreover, claim 3 is patentable independently. The claim reads:

3. The envelope of claim 1 in which the watermark is formed by texturing of the original envelope medium

Again, the Action finds subject matter in Leon that it does not disclose. The Action states, "*Leon further discloses the envelope of claim 1 in which the watermark is formed by texturing of the original envelope medium (column 2, lines 20-46).*"

Nowhere does Leon mention texturing. (Nor is same taught by any of the other cited references.)

Again, the Action failed to establish *prima facie* obviousness, and the rejection of claim 3 must be reversed.

5. Claim 4 (§ 103: Leon + Bhaskaran + Yeung)

Claim 4 depends from claim 1 and is similarly allowable. Moreover, claim 4 is patentable independently. The claim reads:

4. The envelope of claim 1 that additionally has encoded thereon a second digital watermark that withstands at least certain photocopying operations.

In this rejection the Action cites Yeung in addition to Bhaskaran (which was applied to independent claim 1).

Yeung is a survey article that shows some of the applications of digital watermarking to digital media. All of her teachings are all in the context of digital media.[30]

This reference does not mention paper media, such as envelopes or printable substrates. There is nothing in Yeung suggesting use of her digital media techniques with envelopes or paper.

Moreover, Yeung does not disclose any watermarking technique robust to photocopying. Photocopying involves a series of processes, each of which introduces unpredictable distortion and corruption – starting with scanning. This involves sampling reflected light from the original

[30] *See, e.g.*, first sentence of Yeung paper.

print media at sample points along a first grid, e.g., nominally 300 dpi, using optical detectors that – at best – imperfectly mimic the human eye. Next, the resultant scan data commonly must be interpolated and dithered (commonly a stochastic process) to conform to the requirements of the printing mechanism. The printing mechanism then invokes a chaotic process that attempts to yield a printed approximation of the processed data, e.g., by shooting droplets of cyan, magenta, yellow, and black droplets of ink – of just a few possible discrete sizes - at a receiving medium. Other corruptions also come into play – issues such as physical registration of photodetector spacing and ink jet orifii, thermal variations, physical vibrations, the microtopography of the receiving medium, etc., etc. Each photocopier introduces a different combinations of unpredictable distortions to the finished copy.

Yeung does not teach any watermarking technique that is robust to these processes. Watermarks that are "robust" in the digital realm quickly become "fragile" when subjected to photocopying.

None of the references teaches a watermarking technique that survives photocopying, as required by claim 4. And there is no suggestion in Yeung (nor Bhaskaran) of paper media, such as envelopes.

Again, the rejection failed to establish *prima facie* obviousness, and should be reversed.

6. Claim 5 (§ 103: Leon + Bhaskaran + Yeung)

Claim 5 depends from claim 4 and is similarly allowable. Moreover, claim 5 is patentable independently. The claim reads:

> *5. The envelope of claim 4 in which the second digital watermark encodes data useful for linking to an internet computer site.*

Yeung teaches that a watermark can encode, in a digital photograph, the GPS coordinates at which the photograph was taken (i.e., latitude and longitude).[31] The Action contends that such

[31] Yeung, page 39, col. 2, first full paragraph.

GPS information meets the claim requirement of "data useful for linking to an internet computer site."

This stretches too far – especially when the claim is construed with reference to the specification. The specification explains:

> *In accordance with a sixth aspect of the invention, watermarking on an envelope serves as a portal to a corresponding internet site or application (which could be local on the user's PC).*
>
> *As detailed in the assignee's application 09/571,422, filed May 15, 2000, a watermarked document can be held up to a web cam, or scanned by a scanner, and serve to instantly link a user to an Internet site, to invoke an application, etc. (The present assignee offers such services under the Digimarc MediaBridge name.) An envelope marked in this fashion can allow a user to initiate an essentially unlimited range of options.*

The disclosure of application 09/571,422 was incorporated-by-reference into the present specification.[32] That application (which will issue as patent 6,947,571 on September 20, 2005) explains that the watermark used in such application conveys a URL, or an index into a database at which a corresponding URL is stored.

The construction given the claim limitation in the Action goes beyond the bounds of reasonableness, when judged from the perspective of an artisan and from guiding precedent.

More accurately, none of the art cited in the Action teaches the claim limitation.

And again, the leap from Yeung's teachings concerning digital media, to the envelope of claim 5, is without foundation or explanation.

Again, *prima facie* obviousness has not been established, and the rejection should be reversed.

7. Claim 6 (§ 103: Leon + Bhaskaran + Yeung)

Claim 6 depends from claim 4 and is similarly allowable. Moreover, claim 6 is patentable independently. The claim reads:

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32 *See* specification at page 15, lines 7-9.

6. The envelope of claim 4 in which the second digital watermark encodes data representing a device or user that produced the document.

It will be recalled that Leon's *human-readable* information (410) included an identifier of the device that produced the postage label. Since such information was already provided in Leon's arrangement, no modification of Leon to provide such information appears warranted. Again, impermissible hindsight seems to have been employed to guide the combination of references to match Applicants' claim.

Again the rejection should be reversed.

8. Claim 7 (§ 103: Leon + Bhaskaran + Yeung)

Claim 7 stands or falls with claim 4, from which it depends.

9. Claim 8 (§ 103: Leon + Bhaskaran + Yeung)

Claim 8 depends from claim 4 and is similarly allowable. Moreover, claim 8 is patentable independently. The claim reads:

8. The envelope of claim 4 in which the second digital watermark is printed on the envelope at the same time as a franking mark.

The Final rejection states "*Leon discloses the envelope of claim 4 in which the second digital watermark is printed on the envelope at the same time as a franking mark.*"

Not so. Leon has no disclosure concerning a second digital watermark being printed at the same time as a franking mark.

Again, the rejection must be reversed.

10. Claim 9 (§ 103: Leon + Bhaskaran + Yeung)

Claim 9 depends from claim 8 and is similarly allowable. Moreover, claim 9 is patentable independently. The claim reads:

> *9. The envelope of claim 8 in which the second digital watermark is printed on the envelope by the same printing assembly used to print said franking mark.*

Contrary to the assertion in the Final Rejection, Leon has no disclosure of printing a second digital watermark on the envelope using the same printing assembly used to print the franking mark.

Again, reversal is required.

11. Claim 10 (§ 103: Leon + Bhaskaran + Yeung)

Claim 10 depends from claim 4 and is similarly allowable. Moreover, claim 10 is patentable independently. The claim reads:

> *10. The envelope of claim 4 in which at least one of said digital watermarks occupies a region that is also occupied by a franking mark printed on said envelope.*

Digital watermarks are essentially imperceptible. Thus, they can occupy the same area as other indicia without impairing the other indicia.

For example, the specification notes that the watermark can span *all* of one side (or both sides) of an envelope. Likewise, it describes that the watermark can be localized – occupying, e.g., areas printed with postage, return address, or recipient address.[33]

The Final Rejection cites Leon's Figs. 4 and 5 for this teaching. But those illustrations do not show the franking mark occupying a region also occupied by a digital watermark.

Again, the rejection must be reversed.

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[33] Specification, page 4, lines 21-23.

12. Claim 11 (§ 103: Leon + Bhaskaran + Yeung)

Claim 11 depends from claim 4 and is similarly allowable. Moreover, claim 10 is patentable independently. The claim reads:

> *11. The envelope of claim 4 in which the second watermark is formed on a second side of the envelope, opposite a side on which the first watermark is formed.*

The Action dismisses this limitation with reference to "column 6." But review of that column reveals no teaching of an envelope in which one digital watermark is formed on one side of an envelope, and a second digital watermark is formed on the opposite side of the envelope.

Again, the rejection must be reversed.

13. Claim 12 (§ 103: Leon + Bhaskaran)

Claim 12 depends from claim 1 and is similarly allowable. Moreover, claim 12 is patentable independently. The claim reads:

> *12. The envelope of claim 1 in which the second digital watermark is printed on the envelope at the same time as a franking mark.*

The Final rejection states "*Leon discloses the envelope of claim 1 in which the second digital watermark is printed on the envelope at the same time as a franking mark.*"

Again, not so. Leon has no disclosure concerning a second digital watermark being printed at the same time as a franking mark.

Again, the rejection must be reversed.

14. Claim 13 (§ 103: Leon + Bhaskaran)

Claim 13 depends from claim 1 and is similarly allowable. Moreover, claim 13 is patentable independently. The claim reads:

13. The envelope of claim 1 in which the second digital watermark is printed on the envelope by the same printing assembly used to print said franking mark.

Again, contrary to the assertion in the Final Rejection, Leon has no disclosure of printing a second digital watermark on the envelope using the same printing assembly used to print the franking mark.

Again, reversal is required.

15. Claim 14 (§ 103: Leon + Bhaskaran)

Independent claim 14 reads:

14. A blank original substrate suitable for later use in a printing operation to produce a printed document, the blank original substrate having encoded thereon a fragile digital watermark representing plural bits of digital data, said watermark permitting a photocopy thereof to be distinguished from the original.

The rejection of claim 14 should be reversed for each of the reasons detailed above in connection with claim 1 (on which this claim is patterned).

Additionally, the rejection should be reversed because the Action failed to cite any art teaching a "blank original substrate." Leon teaches a postal label. His end product is not a blank substrate. Thus, even if the art were combined as proposed, the combination of claim 14 could not result.

16. Claim 15 (§ 103: Leon + Bhaskaran)

Claim 15 depends from claim 14 and is similarly allowable. Moreover, claim 15 is patentable independently. The claim reads:

15. The substrate of claim 14 in which the watermark is formed with ink.

The rejection of claim 15 should be reversed for each of the reasons detailed above in connection with claim 2 (on which this claim is patterned).

Additionally, the rejection should be reversed because the Action failed to cite any art teaching a "blank original substrate." As noted, Leon teaches a postal label. His end product is not a blank substrate. Thus, even if the art were combined as proposed, the combination of claim 15 could not result.

17. Claim 16 (§ 103: Leon + Bhaskaran)

Claim 16 depends from claim 14 and is similarly allowable. Moreover, claim 16 is patentable independently. The claim reads:

> *16. The substrate of claim 14 in which the watermark is formed by texturing of the substrate medium*

The rejection of claim 16 should be reversed for each of the reasons detailed above in connection with claim 3 (on which this claim is patterned).

Additionally, the rejection should be reversed because the Action failed to cite any art teaching a "blank original substrate." Again, Leon teaches a postal label. His end product is not a blank substrate. Thus, even if the art were combined as proposed, the combination of claim 16 could not result.

18. Claim 17 (§ 103: Leon + Bhaskaran + Yeung)

Claim 17 stands or calls with claim 4.

19. Claim 18 (§ 103: Leon + Bhaskaran + Yeung)

Claim 18 stands or falls with claim 5.

20. **Claim 19 (§ 103: Leon + Bhaskaran + Yeung)**

Claim 19 stands or falls with claim 6.

21. **Claim 20 (§ 103: Leon + Bhaskaran + Yeung)**

Claim 20 stands or falls with claim 11.

22. **Claim 21 (§ 103: Leon + Bhaskaran + Yeung)**

Claim 21 stands or falls with claim 14.

IX. CONCLUSION

The claims are statutory under § 101. The Final Rejection improperly construed the "digital watermarking" limitations of the independent claims to read on Leon's traditional *paper* watermark. Others of the claims' limitations are not found in the art alleged, so the claimed arrangements could not result even if the art were combined as proposed. Moreover, the proposed combinations appear impermissibly tainted by hindsight.

Accordingly, the Board is requested to reverse the Examiner's rejections.

Respectfully submitted,

Date: September 9, 2005

DIGIMARC CORPORATION

CUSTOMER NUMBER 23735

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APPENDIX A

PENDING CLAIMS

1. An original envelope having encoded thereon a fragile digital watermark representing plural bits of digital data, said watermark permitting a photocopy thereof to be distinguished from the original.

2. The envelope of claim 1 in which the watermark is formed with ink.

3. The envelope of claim 1 in which the watermark is formed by texturing of the original envelope medium

4. The envelope of claim 1 that additionally has encoded thereon a second digital watermark that withstands at least certain photocopying operations.

5. The envelope of claim 4 in which the second digital watermark encodes data useful for linking to an internet computer site.

6. The envelope of claim 4 in which the second digital watermark encodes data representing a device or user that produced the document.

7. The envelope of claim 4 in which one of said watermarks indicates to compliant equipment that the envelope should not be reproduced.

8. The envelope of claim 4 in which the second digital watermark is printed on the envelope at the same time as a franking mark.

9. The envelope of claim 8 in which the second digital watermark is printed on the envelope by the same printing assembly used to print said franking mark.

10. The envelope of claim 4 in which at least one of said digital watermarks occupies a region that is also occupied by a franking mark printed on said envelope.

11. The envelope of claim 4 in which the second watermark is formed on a second side of the envelope, opposite a side on which the first watermark is formed.

12. The envelope of claim 1 in which said digital watermark is printed on the envelope at the same time as a franking mark.

13. The envelope of claim 1 in which said digital watermark is printed on the envelope by the same printing assembly used to print said franking mark.

14. A blank original substrate suitable for later use in a printing operation to produce a printed document, the blank original substrate having encoded thereon a fragile digital watermark representing plural bits of digital data, said watermark permitting a photocopy thereof to be distinguished from the original.

15. The substrate of claim 14 in which the watermark is formed with ink.

16. The substrate of claim 14 in which the watermark is formed by texturing of the substrate medium.

17. A printed document comprising the substrate of claim 14 that additionally has encoded thereon a second digital watermark that withstands at least certain photocopying operations.

18. The document of claim 17 in which the second digital watermark encodes data useful for linking to an internet computer site.

19. The document of claim 17 in which the second digital watermark encodes data representing a device or user that produced the document.

20. The document of claim 17 in which the second watermark is formed on a second side of the document, opposite a side on which the first watermark is formed.

21. The substrate of claim 14 in which the watermark indicates to compliant equipment that the document should not be reproduced.

EXHIBIT A

Article from the on-line *Encyclopedia Britannica* re watermarks (submitted with Amendment filed November 1, 2004).

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watermark

Encyclopædia Britannica Article

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design produced by creating a variation in the thickness of paper fibre during the wet-paper phase of papermaking. This design is clearly visible when the paper is held up to a light source.

Watermarks are known to have existed in Italy before the end of the 13th century. Two types of watermark have been produced. The more common type, which produces a translucent design when held up to a light, is produced by a wire design laid over and sewn onto the sheet mold wire (for handmade paper) or attached to the "dandy roll" (for machine-made paper). The rarer "shaded" watermark is produced by a depression in the sheet mold wire, which results in a greater density of fibres—hence, a shaded, or darker, design when held up to a light. Watermarks are often used commercially to identify the manufacturer or the grade of paper. They have also been used to detect and prevent counterfeiting and forgery.

Page 1 of 1
Introduction

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EXHIBIT A

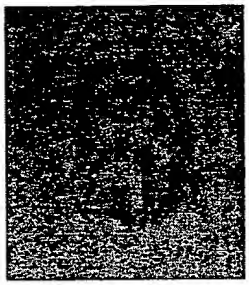
EXHIBIT B

Article from the on-line encyclopedia *Wikipedia* re watermarks (submitted with Amendment filed November 1, 2004).

Watermark

From Wikipedia, the free encyclopedia.

A **watermark** is a recognizable image or pattern in paper that appears lighter when viewed by transmitted light (or darker when viewed by reflected light, atop a dark background). A watermark is made by impressing a water coated metal stamp or *dandy roll* onto the paper during manufacturing. Watermarks were first introduced in Bologna, Italy in 1282; they have been used by papermakers to identify their product, and also on postage stamps, currency, and other government documents to discourage counterfeiting.



Elephant head watermark used on early postage stamps of India

The *dandy roll* is a light roller covered by material similar to window screen that is embossed with a pattern. Faint lines are made by *laid wires* that run parallel to the axis of the dandy roll, and the bold lines are made by *chain wires* that run around the circumference to secure the laid wires to the roll from the outside. Because the chain wires are located on the outside of the laid wires, they have a greater influence on the impression in the pulp, hence their bolder appearance than the laid wire lines.

This embossing is transferred to the pulp fibres, compressing and reducing their thickness in that area. Because the patterned portion of the page is thinner, it transmits more light through and therefore has a lighter appearance than the surrounding paper. If these lines are distinct and parallel, and / or there is a watermark, then the paper is termed *laid paper*. If the lines appear as a mesh or are indiscernible, and / or there is no watermark, then it is called *wove paper*.

The above is true for **line drawing watermarks**, but there is another type called the **shaded watermark**. A shaded watermark, first used in 1848, incorporates tonal depth and creates a greyscale image. Instead of using a wire covering for the dandy roll, the shaded watermark is created by areas of relief on the roll's own surface. A watermark is very useful in the examination of paper because it can be used for dating, identifying sizes, mill trademarks and locations, and the quality of a paper.

Watermarks vary greatly in their visibility; while some are obvious on casual inspection, others require some study to pick out. Various aids have been developed, such as **watermark fluid** that wets the paper without damaging it.

Encoding an identifying code into digitized music, video, picture, or other file is known as a digital watermark.

Watermarks on postage stamps

In philately, the watermark is a key feature of the stamp, and often constitutes the difference between a common and a rare stamp. The "classic" stamp watermark is a small crown or other national symbol, appearing either once on each stamp or a continuous pattern. Watermarks were nearly universal on stamps in the 19th and early 20th centuries, but generally fell out of use and are not commonly used on modern issues.

Some types of embossing, such as that used to make the "cross on oval" design on early stamps of Switzerland, resemble a watermark in that the paper is thinner, but can be distinguished by having sharper edges than is usual for a normal watermark.

Watermark is also the name of an album by Enya.

Retrieved from "http://en.wikipedia.org/wiki/Watermark"

EXHIBIT B

EXHIBIT C

Board's decision in Appeal No. 2003-1084.

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 35

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DIGIMARC CORPORATION

Appeal No. 2003-1084
Reexamination Control No. 90/005,911[1]

HEARD: September 11, 2003

Before HAIRSTON, BARRETT, and FLEMING, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(b) from the final rejection of claims 51-65. Claims 32-34, 36, and 47-49

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[1] Request filed January 16, 2001, by Third Party Requester Verance Corporation, San Diego, CA, for reexamination of U.S. Patent 6,12,392 ('392 patent), entitled "Signal Processing to Hide Plural-Bit Information in Image, Video, and Audio Data," issued September 19, 2000, to Geoffrey B. Rhoads, assigned to Digimarc Corp., based on Application 08/967,693, filed November 12, 1997, which is a continuation or continuation-in-part of several ancestor applications.

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have been canceled. The patentability of claims 1-31, 35, 37-46, and 50 has been confirmed or determined.

We reverse.

BACKGROUND

The claims found patentable during the reexamination relate to methods for steganographically encoding a multi-bit message code into image or audio signals. The claims on appeal recite tangible storage media that store image or audio data that has been steganographically encoded with messages according to those method claims.

Claim 51 is reproduced below.

> 51. A tangible storage medium having an image processed in accordance with the method of claim 1 stored thereon, wherein the multi-bit message code is operable to control equipment; and
>
> wherein the message code is encoded throughout the output image on the storage medium so that the message code can be recovered from first and second non-overlapping excerpts of the output image; and the output image represents a given bit of the encoded message code differently, both in absolute and percentage terms, in said first and second excerpts to reduce image degradation and increase message security; wherein subtraction of the input two-dimensional image from the output image yields a difference frame comprised of difference values, said difference frame having a snow-like appearance in which at least half of said difference values have non-zero values.

No prior art is relied upon in the rejection.

Claims 51-65 stand rejected under 35 U.S.C. § 101 as being directed to nonstatutory subject matter.

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We refer to the final rejection (Paper No. 23) and the examiner's answer (Paper No. 27) (pages referred to as "EA__") for a statement of the examiner's rejection, and to the brief (Paper No. 26) (pages referred to as "Br__") and reply brief (Paper No. 30) (pages referred to as "RBr__") for a statement of appellant's arguments thereagainst.

OPINION

Claim form

We briefly comment about the claim form. Claims 51-65 are apparatus claims which refer to method claims. There is some question whether claims of this form are true dependent claims or whether they are, in fact, independent claims which incorporate by reference the limitations of the independent claims they refer to. Nevertheless, there does not appear to be any question of definiteness, but only how the claims should be treated for fee collection purposes, which is not a matter within the Board's jurisdiction. See Ex parte Moelands, 3 USPQ2d 1474, 1477 (Bd. Pat. App. & Int. 1987) (Examiner-in-Chief Lovell, dissenting in part); Ex parte Porter, 25 USPQ2d 1144, 1147 (Bd. Pat. App. & Int. 1992); In re Warmerdam, 33 F.3d 1354, 1358, 31 USPQ2d 1754, 1757 (Fed. Cir. 1994) (claim 5).

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Statutory subject matter

The claims are divided into three groups: (1) claims 51-55 recite a tangible medium having an image or audio processed in accordance with the method of the independent claims, wherein the multi-bit code is operable to control equipment and wherein the message code has a structure formed by the method of the independent claims; (2) claims 56-60 are similar to claims 51-55 except that they do not recite that the multi-bit message code is operable to control equipment; and (3) claims 61-65 just recite the tangible medium having an image or audio processed in accordance with the method of the independent claims.

The examiner finds that the claims recite an image or audio data which is processed in accordance with the various independent claims to embed a multi-bit message code in the image or audio data (EA3). We agree. The examiner states that descriptive material or data is only considered to be statutory subject matter when it is both functional and is embodied on a computer-readable medium (EA3). We agree. The examiner states that image or audio data per se is not functional data so that the functionality must arise from the embedded multi-bit message code (EA3). We agree. However, we do not agree with the rest of the examiner's analysis.

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As to claims 51-55 which recite that "the multi-bit message code is operable to control equipment," the examiner states (EA4):

> [T]he steganographically encoded data is merely an identification word that must be recognized by a specialized system that is programmed or built to specifically look for such data. This steganographically encoded data cannot, in and of itself, cause a general purpose system to perform any operations. Therefore, while claims 51-55 include language directed to the use of the multi-bit message code to control equipment, this functionality does not reside in the image or audio data itself, but in the equipment, which must be specially designed to anticipate the data, and the claim is directed towards non-functional descriptive material stored on a tangible storage medium, which must be considered to be non-statutory subject matter.

Appellant argues that a "functional interrelationship may originate either from the stored data or as part of the computing processes performed by the computer" (Br6) and claims 51-55 define "an explicit functional interrelationship between the embedded steganographic code data and the equipment" (Br6). It is argued that "the Office's argument that attempts to distinguish one type of functional code from another (e.g., a computer instruction interpreted by a computer vs. a steganographic message that controls equipment) is inappropriate" (Br6). It is argued that "[t]he Office has surpassed its own guidelines in taking a position that the functionality must be inherent in the code and control general purpose equipment" (RBr4) and that claims 51-55 "recite a functional code that is

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operable to control equipment, without limiting the type of equipment that can be controlled" (RBr4).

Part of the examiner's problem with claims 51-55 appears to be more in the nature of the claims being misdescriptive than that the code is not functional, i.e., that the embedded code cannot control equipment because it is not computer instructions. This is a matter for 35 U.S.C. § 112, not § 101. To head off any such rejection, we note that "operable to control equipment" is a broad term and that data as well as instructions can be considered to broadly control equipment. If claims 51-55 otherwise define statutory subject matter, the presence of the limitation "the multi-bit message code is operable to control equipment" cannot make the claim nonstatutory. We think it makes sense to look at the broadest claims, claims 61-65; if these claims define statutory matter, then so should claims 51-60 which contain the same limitations in addition to other limitations about the structure created by the method.

The examiner states (EA5):

> In addition, the "structural" limitations of these claims do not define the physical structure of the product, but rather the relationship between the data elements of message code and the image or audio data. None of these claims define hardware or hardware and software combinations, since the data is not, in and of itself functional. Any meaningful image or audio signal has a "structure" that defines the relationship between the various data elements that make up the signal. However, unless the audio or image signal specifically imparts functionality upon a general purpose system, they remain non-functional descriptive matter, and are non-statutory,

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> regardless of the level of detail recited regarding the "structure" of signal. Therefore, the specific structural relationships between the data elements stored on the tangible medium does not impart any functionality upon the data, so that it continues to be non-functional descriptive material. Therefore, the claimed invention, viewed as a whole, is considered to be directed towards non-functional descriptive material stored on a storage medium, which is not considered to be statutory subject matter.

Appellant argues that the USPTO guidelines state that "[w]hen functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases" (Br6-7). It is argued that the claims recite patentable subject matter under Federal Circuit precedent of In re Lowry and In re Warmerdam because "they recite a tangible storage medium having processed image/audio data stored thereon having steganographically encoded data that forms specific structural elements when stored on that medium" (Br7). See also RBr5-7. It is argued that the claims define a statutory product because they define a useful manufacture by identifying the physical structure (Br8).

We disagree with the examiner's analysis of the claimed subject matter as being directed to nonstatutory descriptive material. As stated in the Manual of Patent Examining Procedure § 2106 IV.B.1 (8th ed. Rev. 1, Feb. 2003):

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and

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> computer programs which impart functionality when employed as a computer component. . . . "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> . . . When functional descriptive material is recorded on some computer readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized.

Claims 51-65 are directed to images or audio data embodied in a tangible medium having embedded message codes of a specific structure which can be later discerned for identification purposes by a machine. They therefore meet the definition of "functional descriptive material" because the embedded message codes impart functionality when employed in a computer capable of acting on them. The claims are not directed to the images or audio data per se and, so, cannot be described as mere "nonfunctional descriptive material." This is all the analysis that should be required. It is sufficient that the claims define the functional relationships either expressly as in claims 51-60 or by incorporation by reference to the process as in claims 61-65, they do not need to define the physical structure of the product.

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We conclude that the examiner has failed to establish a prima facie case of nonstatutory subject matter. The rejection of claims 51-65 is reversed.

REVERSED

KENNETH W. HAIRSTON
Administrative Patent Judge

LEE E. BARRETT
Administrative Patent Judge

MICHAEL R. FLEMING
Administrative Patent Judge

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